

Independent claim 1 is directed to a method for manufacturing aluminum cast product enclosing a pipe inserted therein. A controlling member is projected into a cavity of a mold. A pipe is arranged at a predetermined position in the cavity. The pipe is held in the cavity by insertion of the controlling member into at least one opening of the pipe or by insertion of at least one end of the pipe into a hole of the controlling member. Molten aluminum alloys are poured into the cavity so as to enclose the pipe with the aluminum alloy. Independent claim 17 is also directed to a method for manufacturing an aluminum cast product similar to that of independent claim 1, further having the controlling member configured to allow axial movement of the pipe without radial dislocation.

Independent claim 8 is directed to a method for the production of aluminum cast product enclosing a pipe therein. A bracket having a hole is coupled to a pipe. The pipe is arranged at a predetermined position in the cavity of a mold. The pipe is held in the cavity by inserting a controlling pin into the hole of the bracket. The controlling pin extends through a wall of the mold into the cavity. A molten aluminum alloy is poured into the cavity so as to enclose the pipe within the aluminum alloy. Independent claim 18 is also directed to a method for manufacturing an aluminum cast product similar to that of independent claim 8, further having the controlling member configured to allow axial movement of the pipe without radial dislocation.

The JP'855 patent discloses a method of fixing a pipe in a ceramic mold. The method includes forming a concave portion at an external surface of a ceramic mold facing an inner cavity for mounting an end of an enclosed pipe thereon. A dent is defined by the concave portion with plastic weirs located at both sides of the concave portion toward the inner cavity and a mold frame. Castable refractory is poured and then cured in the dent so as to fix the pipe in the ceramic mold.

As the Examiner acknowledges, the JP'855 patent fails to teach or suggest an arrangement where a controlling member is inserted into an opening of a pipe. The JP'855 patent discloses a method where a castable refractory (14) is poured into the dent of a cavity to fix the pipe (7). The pipe (7) is kept in position by the use of oil or rubber clay (13). In particular, the concaved portion (11a) of the JP '855 patent defined by the ceramic layer (10) and the small openings (5a) formed at both sides of the mold flask (5) are packed with the oil or rubber clay (13) as a plastic material for positioning the pipe (7) prior to pouring the castable refractory (14). In contrast, the present claimed invention teaches the insertion of a controlling member into at least one opening of the pipe P.

Furthermore, the controlling member arrangement of the present claimed invention as set forth in independent claims 17 and 18 is directed to a pipe P that, although is molded in the cavity, is movable along its axial direction without radial dislocation at its end pl. By having such an arrangement with the controlling member, axial movement of the pipe P effectively absorbs thermal stresses applied to the pipe P during pouring of a molten alloy and thus assures a location of the pipe P at an initially designated position. The JP'855 patent fails to teach or suggest an arrangement of a pipe which is movable along an axial direction. For example, since the pipe is embedded in the cured castable refractory, it is understood that the pipe is firmly fixed without movement along both axial and radial directions. Therefore, a pipe of the JP'855 patent is easily deformed or dislocated at its middle part in a mold due to thermal stress during pouring of a molten metal.

In addition, the Examiner further acknowledges that the JP'855 patent fails to teach or suggest a bracket having a hole for the insertion of the controlling member as defined in claim 18. Moreover, the Examiner further notes that the JP'855 patent does not teach or suggest subjecting the controlling member to surface treatments, such as a coating with a layer of Ti, TiC, TiN, and/or BN or nitrides, to inhibit in flow of a molten alloy as defined in claim 7.

The coating utilized in the present claimed invention of claim 7 also effectively inhibits sticking of the controlling member to an aluminum alloy to allow ease of separation after completion of casting.

The JP'855 patent is directed to a ceramic cast product even as modified by the FR'333, as suggested by the Examiner, while the present claimed invention is directed to an aluminum cast product and method for production of an aluminum cast product.

The FR '333 patent discloses use of a plug (h) for sealing openings of the parts (b-d). A longitudinal direction of a pipe member (a) crosses in flow of a molten metal. Due to such an arrangement, kinetic energy of the poured molten metal is applied to the pipe member (a) and causes dislocation of the pipe member (a) along a radial direction. In order to inhibit dislocation, the pipe member (a) has legs (e) held in contact with an inner wall of a mold. Thus, because the pipe member (a) is located at a predetermined position in the mold, there can be no movement along the axial direction contrary to the Examiner's stated conclusion. The FR '333 patent does not disclose axial movement without radial dislocation and, therefore, it would not be obvious to modify the JP'855 patent as suggested by the Examiner "to allow axial movement without radial dislocation." In view of the FR'333 patent failing to teach or suggest an arrangement of a pipe that allows movement in an axial direction without radial dislocation, the FR'333 patent does not overcome the deficiencies of the JP'855 patent as set forth hereinabove. None of the secondary references have the bracket or the coating as acknowledged by the Examiner. There is no teaching or suggestion other than the Applicants own disclosure to provide this structure. Furthermore, the "Applicants admitted prior art" discloses a cooling medium rather than the specific compressed gas of claim 9 and further thus does not overcome the deficiencies of the JP'855 patent set forth herein.

CONCLUSION

In view of the foregoing, the Applicants believe that claims 1-18 are in condition for allowance. Reconsideration of the Examiner's rejections and allowance of claims 1-18 are respectfully requested.

Respectfully submitted,

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